IN THE SPECIFICATION:

Please replace paragraph number [0013] on pages 3 and 4 with the amended paragraph that follows.

[0013] Fig. 1 ~~a is~~ is a block diagram of an apparatus according to the present invention;

Please cancel paragraph number [0021] and replace paragraph numbers [0022] and [0023] on page 4 with the amended paragraphs that follow.

~~**[0021]** Fig 9 is an illustration of an electronic circuit of a nail analog chip of the security apparatus;~~

[0022] Fig. ~~10~~ 9 is a block diagram of ~~the~~ a method according to the present invention; and

[0023] Fig. ~~11~~ 10 is a block diagram of a ninth embodiment of an apparatus according to the present invention.

Please replace paragraph number [0024] on page 4 with the amended paragraph that follows.

[0024] The preferred embodiment ~~of the 10~~ of the present invention is a human machine interface, generally designated 10, shown in Fig. 1. The ~~present invention~~ human machine interface 10 has two main elements; a validator controller 12 and a data transmitter 14. The validator controller 12 contains a validator status actuator 16, which is in communication with a validator receiver 18 via a validator logic circuit 20 (such as an embedded controller). Further, the validator status actuator 16 is configured to process and perform certain actions based upon the value or characteristics of a data signal 22. The data transmitter 14 is in contact with a human nail 24 and, in addition, the data transmitter 14 is in communication with the validator controller 12.

Please replace paragraph number [0026] on page 5 with the amended paragraph that follows.

[0026] Using the total resistance formed by the conductive flesh 26 under the nail 24 between electrodes or wires is another manner in which to associate a semi-unique value to the user. If there are two or more wires through the human nail 24, the total resistance between

those two electrodes is indicative of the total amount of flesh on the forefinger of the user. This may be correlated with the degree of flesh discoloration under the nail due to pressure on the finger at that time to yield a more unique profile. The resistive measurement, periodically checked by a watchdog timer 15, will also strongly indicate when the nail 24 is removed from the forefinger in a transplant attempt. Also, these electrodes may be used to provide tactile feedback when a voltage is applied.

Please replace paragraph number [0028] on pages 5 and 6 with the amended paragraph that follows.

[0028] Further, more wires may be used to get a more detailed profile of the finger resistance. Other factors influencing finger resistance would be the ratio of flesh to bone diameter and whether pressure is being placed on the human nail 24 or on the bottom of the finger of the user. Finally, as the wires move forward on the user's human nail 24 through its natural growth rate, the resistance will slowly change in an anticipateable fashion. This may be useful in assisting in detecting a transplanted finger or the data transmitter 14 placed on an artificial conductive material. To best measure resistance with accuracy using a simple circuit, two wires can be utilized, which connect directly to the resistor (conductive flesh 26). This presents a complex time versus resistance profile as the human nail 24 grows or the finger is pushed on a solid surface. It is also envisioned that a watchdog timer 15 may be periodically and/or sporadically used to verify that the resistance or capacitor plate's formed capacitance is in a user-specific range, and additionally, verify whether the human nail 24 has been moved or removed. It is recognized that although the physical properties of an individual's nail, surrounding areas or electrode measurements of its surrounding areas gradually change, those changes are generally not fast enough to present erroneous readings on a short term basis, such as in a struggle situation, or may be compensated for by other means, such as measuring and utilizing ambient humidity as a factor in the nail's properties calculations. Additionally, especially in the case of using resistance measurements of the flesh under the nail, the values acquired while there are no forces applied to the forefinger may be most accurate in measuring factors such as closeness to the end of the nail or cumulative nail growth. An efficient manner of detecting human nail 24 removal, is a method causing decreased capacitance and increased

voltage and may use a high-impedance-input voltage limiter, in parallel with the nail-derived capacitor, such as a specially designed ESD semiconductor device. When the nail is removed, capacitance decreases, the voltage increases, and the current partially discharges the capacitor.

Please replace paragraph number [0030] on pages 6 and 7 with the amended paragraph that follows.

[0030] In a struggle situation or in a situation wherein an attempt is being made to physically force a person to actuate the validator controller 12, the proximity of the attacker's finger will typically add capacitance and/or alter the data signals 22, such that the ~~security apparatus~~ human machine interface 10 will not function, enable and/or validate. Alternatively, the ~~security apparatus~~ human machine interface 10 may be provided with an overall timeout function where the ~~apparatus~~ human machine interface 10 ceases to function within a predetermined time period. Alternatively, the components of the ~~apparatus 10~~ data transmitter 14 may be constructed or formed such that if any attempt to move or remove them occurs, the data signals 22 are re-randomized or the ~~device~~ human machine interface 10 is destroyed or disabled. In the event that the ~~apparatus~~ human machine interface 10 is damaged, destroyed or expired, an alternative means of validation may be provided. Additionally, the ~~apparatus~~ human machine interface 10 may be configured to "trap" the finger, hand or arm of an operator who has failed to pass the validation test.

Please replace paragraph numbers [0032] and [0033] on pages 7 and 8 with the amended paragraphs that follow.

[0032] In a second embodiment of the present invention, as illustrated in Fig. 2, the ~~apparatus~~ human machine interface 10 further includes a direct physical connection element 32 between the validator receiver 18 and the data transmitter 14. Alternatively, the direct physical connection element 32 may be combined and integrated with the validator receiver 18. This direct physical connection element 32 may be a wire or multiple wires or other substrate, which allows the data signal 22 to travel through or on it. Further, in this embodiment, the data transmitter 14 is a capacitance plate 34, which is secured directly to or in conductive contact with the human nail 24. In order to complete the human nail conductive circuit 30, a circuit return

conductor 36 is provided on the human finger 28 or toe. The data signal 22, in the form of a capacitance value, travels through the direct physical connection element 32 and is received by the validator receiver 18. The capacitance plate 34 may have a gold-leaf conductive coating or a ~~gold-plated~~ human nail 24 having a gold-plating thereon trimmed to specific values by trimmed area to facilitate the creation and measurement of capacitance values. In addition, the ~~apparatus~~ human machine interface 10 may use an array of capacitors 34 that function as a bar code. Human nail 24 modifications, such as thinning or thickening the area under just one of the capacitance plates 34, makes it more difficult to estimate another person's capacitance by measuring the thickness of their nail. This would decrease the possibility of a person attempting to duplicate the user's capacitance.

[0033] A third embodiment of the present invention is illustrated in Fig. 3. In this embodiment, the validator controller 12 further includes a validator emitter 38 configured to emit signals (such as electromagnetic waves, light, RF, infrared or ultraviolet) towards the data transmitter 14. Additionally, the data transmitter 14 includes a nail ~~mounted~~ solar cell 40, preferably mounted directly to the human nail 24, which receives signals, preferably light signals, from the validator emitter 38. This nail ~~mounted~~ solar cell 40 powers the data transmitter 14 ~~and~~ which emits a data signal 22. Further, the nail solar cell 40 data may be replaced or supplemented with a higher speed device, e.g., a phototransistor. The data transmitter 14 also includes a nail digital chip 42, preferably mounted directly to the human nail 24, which is configured to communicate with both the nail solar cell 40 and a nail signal emitter 44 using digital logic. The nail ~~mounted~~ digital chip 42 receives nail-specific data from memory or the nail analog chip 48 and/or information from the nail solar cell 40 and communicates the data signal 22 to the nail signal emitter 44, which, in turn, emits the data signal 22 towards the validator controller 12. The validator receiver 18 then receives the data signal 22 and passes the data signal 22 through the validator logic circuit 20 for processing and verification for the validator status actuator 16.

Please replace paragraph number [0036] on page 9 with the amended paragraph that follows.

[0036] In the sixth embodiment of the present invention, as illustrated in Fig. 6, the validator emitter 38 emits a signal to the nail solar cell 40, which is in communication with

the nail digital chip 42 in the data transmitter 14. The data transmitter 14 further includes a nail analog chip 48 to measure the capacitance between capacitance plates 34 secured to the human nail 24 and the circuit return conductor 36 secured to a human finger 28 or toe. ~~One embodiment of the capacitance measuring aspect of the circuit of the nail analog chip 48 is illustrated in Fig. 9.~~ This nail analog chip 48 transmits this measured capacitance value to the nail digital chip 42, which transmits the data signal 22 through a direct physical connection element 32 to the validator receiver 18. The data signal 22 then proceeds as discussed above.

Please replace paragraph number [0038] on pages 9 and 10 with the amended paragraph that follows.

[0038] In an eighth embodiment, as illustrated in Fig. 8, the validator controller 12 may also include a recording device 50 in communication with the validator status actuator 16 via the validator logic circuit 20. This recording device 50 is configured to log specific events or conditions occurring within or outside of the ~~security apparatus~~ <u>human machine interface</u> 10 and any associated devices and/or also may be located in or in communication with the data transmitter 14. Further, as discussed hereinafter, the recording device 50 may constitute a number of devices capable of receiving information from the human machine interface 10 or from an external source. For the firearm example, the recording device 50 can log the number of locking and unlocking occurrences. If the validator controller 12 or the data transmitter 14 are configured to randomly or sporadically check resistance, capacitance, temperature, pulse or other data occurrences, the recording device 50 may log the results of these occurrences. This would increase the difficulty in transplanting or attempting to transplant the data transmitter 14 onto another person or onto an artificial device designed to simulate the owner's characteristics. If an unusual reading would occur, the device may disable itself or go into a non-enabling state temporarily or permanently. The eighth embodiment of the present invention also includes a data transmitter protective layer 52 covering and protecting the data transmitter 14. This data transmitter protective layer 52 is formed such that it will not interfere with the communication of data signals 22 between the data transmitter 14 and the validator controller 12. Similarly, a validator controller protective layer 54 may be provided to cover and protect the validator controller 12. As with the data transmitter protective layer 52, the validator controller protective

layer 54 should not interfere with any communication of signals between the validator controller 12 and the data transmitter 14.

Please replace paragraph numbers [0040] and [0041] on pages 10 and 11 with the amended paragraphs that follow.

[0040] The advantage of using a restricted, semi-fluid area of resistance, insulator-compound or conductor compound whose profile is established at placement time and a) whose profile remains essentially unchanged for the duration of the time the user is wearing the data transmitter 14 and b) whose profile is based on an area of a fixed gap typically between the data transmitter 14 and the wearer's nail 24 and c) whose "final" profile is established at placement time and is strongly influenced by the motions of the individual placing the data transmitter 14 onto the human nail 24 is as follows; it creates unpredictable further randomized artificial characteristics to be read by the data transmitter 14. Also, the grooves and ridges configuration under the nail 24 provide a profile, such that if the ~~device 10~~ data transmitter 14 is removed and replaced on the same nail 24 or another nail 24, it is highly unlikely to return to the same profile and, hence, will influence any electrical readings based on its physical configuration.

[0041] As shown in Fig. 8, the ~~apparatus~~ human machine interface 10 may also be provided with an enable/disable controller 58 in communication with the validator status actuator 16. This enable/disable controller 58 can control a triggering device 60, such as a firearm trigger device or other locking mechanism, enabling or disabling the triggering device 60. This is particularly useful when the present invention is used as a security apparatus, or required for other secure transactions.

Please replace paragraph numbers [0043]-[0045] on pages 11-13 with the amended paragraphs that follow.

[0043] The present invention ~~10~~ also includes a method of enabling or disabling an event, as shown in Fig. ~~10~~ 9. The method includes the steps of: providing a validator controller 12 having a validator status actuator 16 in communication with a validator receiver 18 via a validator logic circuit 20, the validator status actuator 16 configured to process and perform

actions based upon data signals 22, and the validator receiver 18 configured to receive data signals 22, a data transmitter 14 in contact with a human nail 24 and in communication with the validator controller 12 (step 100); receiving data signals 22 by the validator receiver 18 (step 102); processing the received data signals 22 by the validator logic circuit 20 (step 104); and performing an action by the validator status actuator 16 based upon the received data signals 22 (step 106). The data signal 22 may be based on the physical characteristics of the human nail 24, the relative position of the human nail, with respect to an external point, based on data previously logged in the data transmitter 14, data from the validator controller 12 and/or the state of the data transmitter 14.

[0044] The data transmitter 14 may be used as a remote controller device, may provide a user with tactile feedback, may provide a user with visual feedback by using an LCD display and may transmit the data signal 22 by modulating an electronic shutter to modulate a signal reflected or retroflected from a selected device back to a selected device or use polarization to further allow the individual to modify the signal. The data transmitter 14 may act generally as a transponder. An example of tactile feedback that may be useful is a "shock", "tingle" or vibration feedback. This tactile/shock feedback can be very useful to indicate a transaction did or did not take place. Tactile feedback may also be generated by a piezoelectric element placed on the human nail 24. Also, a variety of feedback pulse trains, pulse counts, strengths, combinations or even a Morse code may be useful. An external shock pulse to the operator's finger (either through wires going through the human nail 24 or at another location on the forefinger) can prompt the user to measurably respond with an intelligent action at a specific time, e.g., pushing the finger forward, down, etc. This also indicates that the user is not unconscious and is not having his or her finger mechanically manipulated without his or her knowledge. The user may also respond with useful information, such as status, password, or duress code or action, including specific minor movements in the finger, which convey data used in deciding validity and/or performing an action. The validator status actuator 16 and the enable/disable controller 58 may use a solenoid, muscle wire, magnetic fluid, hydraulics, pneumatics or other suitable means to implement the desired action or convey desired data upon receipt of the verified data signal 22. Further, the ~~security apparatus~~ <u>human machine interface</u> 10 may be adapted to contain additional logic to incorporate applicable secure transmission

algorithms and/or encryption algorithms and/or challenge-response methods within the ~~security apparatus~~ human machine interface 10 or between the ~~security apparatus~~ human machine interface 10 and external devices or to the fingernail data transmitter. When ultra secure validation is desired or an interloper is suspected, identical rolling randomized codes stored only in the data transmitter 14 and validator logic circuit 20 may be used to secure the data signal 22. This is useful when the validator controller 12 is at a remote location from the data transmitter 14 and the data signal 22 is conveyed by insecure communication infrastructure. The individual components of both the validator controller 12 and the data transmitter 14 may be provided in separable layers. It is also envisioned that the ~~security apparatus~~ human machine interface 10 may be adapted to detect the presence of an interposing or adjacent foreign object, such as a finger blocking the data signals 22, or detect the modification of the human nail 24 characteristics. The capability to monitor the status of a trigger-operated device and provide tactile feedback in response to the status is useful for, as an example, alerting the user whether a saw motor is drawing too much current or if a staple gun is nearly out of staples.

[0045] If the validator controller 12 has communicated with the data transmitter 14 within the last few seconds, it is reasonable to assume that a medical operation to transplant the finger, toe or human nail 24 onto someone else has not occurred in that short period of time. In this case, a more detailed and accurate (and time consuming) validation process may not be necessary. Generally, the more resolution used to measure any electrical value, including capacitance, the longer it takes to complete the measurement. While this may save a few milliseconds, in a high-speed firearm trigger actuation event, the time savings may be valuable. Further, if the user has gone on vacation and the validator controller 12 has not communicated with the data transmitter 14 during that time period, it may be desired that the human nail 24 characteristics be scrutinized in greater detail. For example, the expected change in growth of the human nail 24 could be verified along with a password, blood type, fingerprint, etc. If the human nail 24 has not grown the expected amount, the possibility that it has been mounted on an artificial substrate or other substance is significant. An inherent advantage of the ~~present invention~~ human machine interface 10 is its reliance on the human nail 24, which is a constantly growing substrate. Due to its constant growth, the human nail 24 has a variable validity period from about 0-4 months depending upon the placement location of the device and other biological

factors such as time of year. This is particularly useful in situations where the permanent right of access or use is not desired.

Please replace paragraph number [0047] on page 14 with the amended paragraph that follows.

[0047] A further enhancement to the ~~device~~ human machine interface 10 would be an electrical ground shield above the capacitor plates to isolate the plates from any capacitance variation formed between the top of the plates measuring the human nail 24 capacitance and a conductive area above them, such as the metal body of a firearm. This would add a fixed capacitance value to the overall reading, but would minimize a smaller, but variable, capacitance value resulting from a different positioning of the finger or a different configuration of any conductive or metallic areas in proximity to the ~~valuator~~ validator controller.

Please replace paragraph numbers [0049] and [0050] on pages 14 and 15 with the amended paragraphs that follow.

[0049] The data transmitter 14 may further incorporate a "low-power-watchdog-circuit" which would place a voltage charge on capacitor plates, typically those that measure the nail 24 capacitance. The low-power-watchdog-circuit would have an electronic device whose purpose is to "avalanche" or "short-out" or conduct electricity if the voltage goes significantly above a value greater than the initial charge placed on the plates, such as a specially designed ESD event or avalanche-effect semiconductor. If the human nail 24 or data transmitter 14 is removed from the individual while the data transmitter 14 is in an `off' or low powered state, the capacitance between the aforementioned plates would go down causing the voltage between those plates to go up and the avalanche device to conduct much of the charge away. When the data transmitter 14 is again placed on the user or a false substrate or false user, and the data transmitter l4 "wakes up" for its normal watchdog timer functions, or is otherwise activated, the voltage charge across the plates will then be substantially lower than its original charge and its circuitry will detect this lower voltage and conclude the ~~device 10~~ data transmitter 14 has been tampered with while it was in the low-powered or sleep state and disable itself or erase its data preventing further unauthorized use. It is recognized that leakage current through the nail 24 may require this process to be refreshed at a rate of over 10,000 times per second.

[0050] Another embodiment of the data transmitter is a simple plate above or in approximate contact with the human nail 24 that roughly parallels it. The dimensions of the plate and the overall capacitance(s) formed (between the plate and the conductive flesh 26, and the distances between the plate and the conductive flesh 26) create a resonant circuit(s), which, when energized, by a device ~~10~~ such as a microwave transmitter, resonate at specific resonant frequency(s) dependent on the components and factors mentioned above and create a microwave transponder-like device. In this embodiment, no wire is needed between the data transmitter 14 and the validator receiver 18.

Please replace paragraph number [0052] on page 15 with the amended paragraph that follows.

[0052] The ~~device~~ human machine interface 10 works symbiotically with a fingerprint reader. Since the device can store data such as a person's identification, expected fingerprint pattern, and other security or authorization or classification, it enables a fingerprint reader which is "unfamiliar" with this new set of prints to validate that the individual whose prints it belongs to is authorized or belongs to a category of people authorized to gain access, perform functions, etc. Combined with a fingerprint reader, the resulting ~~device~~ human machine interface 10 also can decrease the fingerprint reader's error rate of false positives or false negatives.

Please replace paragraph number [0061] on page 18 with the amended paragraph that follows.

[0061] If the nail solar ~~receiver~~ cell operates at the light energy area of the spectrum and not the RF area, it can also use ambient light to recharge a power source or battery in the data transmitter 14, especially during periods it is not being used to communicate with the validator controller 12. This power may be used for other purposes such as periodic and/or sporadic checks by watchdog timer 15 ~~checks~~ of wearer's pulse rate and/or capacitance and/or amplifying or boosting the signal later to the validator receiver 18, to allow it to operate over greater distances.

Please replace paragraph number [0068] on pages 19 and 20 with the amended paragraph that follows.

[0068] It should be noted that the ~~device~~ human machine interface 10 measures a resultant capacitance formed by the area(s) of the plates, any conductive adhesives, any insulating adhesive compounds, any other interacting structures such as electrostatic shielding, an aggregate measurement effected by the individual's grooves and the dielectric constant of the wearer's nail, and does not necessarily always measure the wearer's fingernail thickness.

Please replace paragraph numbers [0072]-[0074] on pages 20 and 21 with the amended paragraphs that follow.

[0072] When the present invention is used as a remote control apparatus, an accelerometer or tilt sensor presents particularly useful data which is passed or logged and later passed between the data transmitter 14 and the validator controller 12. Based on the position of the nail 24 (and the data transmitter 14, in contact with the nail 24) in space (or with reference to an external point in space), the ~~apparatus~~ human machine interface 10 creates an entirely new approach to the remote control of machinery, appliances, etc. The user can simply rotate his or her nail 24, or move the nail 24 up and down, to compose and send a useful signal from the data transmitter 14, which is attached to or adjacent the nail 24. In such an embodiment, the data transmitter 14 may include the accelerometer or other input device, to allow the user to, for example, turn a television volume up by simply twisting or moving his or her nail 24. Similarly, it is envisioned that an accelerometer may not be needed, if the human machine interface 10 simply relies on the nail colorization occurring when the user presses two fingers together, or when the user stresses the nail 24 with another nail 24 in a variety of directions or relies on detecting a polarization angle of the data signal 22 created by rotating the data transmitter 14. As discussed in detail above, the use of nail 24 color could pass an appropriate signal from the data transmitter 14 to the validator controller 12. Other methods for the wearer to communicate with the data transmitter 14 include tilt switches, tilt detectors, piezoelectric elements, detecting a specific motion over a magnet, creating a conductive path between bare contacts on the data transmitter 14, etc.

[0073] Using the present invention as a remote control device, the user may press harder or lighter, or against different digits (all fitted with the ~~device 10~~ data transmitter 14), such that a variety of different signals, and therefore control information, could be sent to a

remote device. The use of the present invention as a remote control would obviate the need for a separate, and easily lost or misplaced, remote control unit.

[0074] A ninth embodiment directed to such a human machine interface (or remote control device) is illustrated in Fig. ~~11~~ <u>10</u>. This human machine interface 10 acts as a remote control for one or multiple devices. In this example, the human machine interface 10 acts as a remote control for a lamp 70 and a television 72. A user attaches the validator controller 12 to both the lamp 70 and the television 72 (or the validator controller 12) is integrated with the electrical or structural system of each unit). In this embodiment, a tilt sensor 74 would be used and integrated with the data transmitter 14. This tilt sensor 74 senses and outputs a signal based upon the orientation of the data transmitter 14, as attached or in operative relationship to the human nail 24. When the user moves his or her nail 24, the tilt sensor 74 moves and outputs a signal to the nail analog chip 48, which outputs the signal to the nail digital chip 42. The nail digital chip 42 then logs, accumulates and/or interprets and then transmits the data signal 22 towards the validator receiver 18.

Please replace paragraph number [0077] on page 22 with the amended paragraph that follows.

[0077] The validator controller 12 emits a signal, typically light, from the validator controller 12. If the signal is received by the directional reflector 76 at too great of an angle, the reflector 76 (e.g., with directional black parallel plates) absorbs the signal and no return signal 22 is received by the validator receiver 18. However, if the angle is acceptable, meaning that the user is pointing towards or roughly towards the validator controller 12, the ~~reflector 76 does~~ <u>directional black parallel plates do</u> not absorb the signal, and instead the signal 22 is returned as modulated by the shutter 78. In the specific example, if the user points his or her nail 24 at the television 72, and rotates the nail 24, the tilt sensor 74 emits the signal 22 towards the validator controller 12 on the television 72, thereby performing a control action on the television 72. Since the lamp 70 and its associated validator controller 12 are not in "line" with the reflector 76, no signal is emitted towards the validator controller 12 on the lamp 70. Therefore, the lamp 70 will not perform an action, having been given no signal. In place of the tilt sensor 74, an accelerometer and/or polarization filters may be utilized.

Please replace paragraph numbers [0080] and [0081] on page 23 with the amended paragraphs that follow.

[0080] It is, therefore, a characteristic of the human nail 24 to have the ability to reflect almost any action the individual performs with his finger. Since most "valuable" actions done by a wearer during work or recreation are either verbal or hand-based, the human nail 24 is in a unique position to monitor and/or record such hand-based actions. Further, it is in a unique position to intercept and be aware of any actions meant solely to signal it. Due to the speed and immediacy of finger motions, the interpretations can be achieved quickly and often while carrying items in the same hand, or in the midst of other actions. Additionally, if an accelerometer or tilt sensor 74 is used to calculate the position of the nail, a positioning system, generally designated 17, considered to be a "personal positioning logging system" is envisioned. Also, the continuous logging of all human nail 24 characteristic data along with user created data or state change requests described herein and a time stamp for the data may be useful.

[0081] Additional examples of further securing the present invention include securing information transmitted between the data transmitter 14 and the validator controller 12 using quantum encryption or, possibly, an emitter may be included to "jam" an attempt to intercept communication signals within the ~~device~~ human machine interface 10.

Please replace paragraph number [0084] on pages 23 and 24 with the amended paragraph that follows.

[0084] It is envisioned that the positioning system 17 of the validator logic circuit 20 may include a Global Positioning System (GPS) or implementing software, which, when used in connection with the recording device 50, can track and record position events. For example, the device can track and log the GPS coordinates of the validator controller 12 and/or the data transmitter 14. Also, the device can track the time of an event, as well as other associated events, such as compass heading, container status, quantity of triggering, and other data regarding a mobile device. Another example is in using this GPS-enabled system to track and log the location of a vehicle especially when the ignition is turned on or off by the user's data transmitter 14. Further, this tracking and logging system can be used to track an employee's entrance to or exit from a building, even without a GPS capability. More detailed or personal data can be

collected using an accelerometer 74 on or in the data transmitter 14 or validator controller 12, the accelerometer can be used to log the relative location of the human nail 24 (and, hence, the finger tip) and to receive state change requests or information from the user.

Please replace paragraph number [0087] on page 24 with the amended paragraph that follows.

[0087] Although not limiting, the ~~present invention~~ human machine interface 10 is particularly useful with trigger-operated tools, storage units, locking mechanisms, software-logic keys, personal identification systems, credit validation systems, computer access, fund transfers and other e-commerce transactions, authorized access situations, third-party information transactions, transportation and travel transactions, Internet transactions, pharmaceutical transactions, licensing, registration, visa and passport transactions, etc.

Please replace paragraph number [0089] on page 25 with the amended paragraph that follows.

[0089] Next, a key is inserted into the validator controller 12, and the individual places his or her finger on the firearm trigger, pushing his or her finger to engage a push-button switch, powering the ~~security apparatus~~ human machine interface 10. The validator logic circuit 20 causes a pulse generator in the validator emitter 38 to power the data transmitter 14, capacitance plates 34 and inductor 46 (resonant circuit). This resonant circuit "rings" or oscillates at a specific frequency determined by the value of the inductor 46 and the capacitance of the human nail 24. This frequency or data signal 22 is received by the validator receiver 18, and the exact frequency in MHz is counted by the validator logic circuit 20 and converted to an 8-bit to 36-bit binary number. The validator logic circuit 20 then stores the frequency value in Flash memory PROM in the validator logic circuit 20, which is typically an 8-bit MPU, such as a Motorola MC6811 or a Microchip PIC-based MPU. The key is then removed, and the individual is ready to use the ~~security apparatus~~ human machine interface 10. Further, the ~~security apparatus~~ human machine interface 10 powers itself down automatically after 10 minutes of operation without a signal being received by the validator receiver 18. Alternatively, the individual powers down the ~~unit~~ human machine interface 10 by re-engaging the same push-button switch.

Please replace paragraph number [0092] on page 26 with the amended paragraph that follows.

[0092] In another specific example of a ~~security apparatus~~ human machine interface 10 embodiment, wherein the validator controller 12 is mounted on a firearm, a key is inserted into the validator controller 12 and the individual places his or her finger on the firearm trigger and pushes his or her finger forward to engage a push-button switch. The push-button switch powers the validator controller 12 and releases a validator contact spring, allowing it to push forward against the person's fingernail. In this example, the validator contact spring is the direct physical connection element 32. The validator contact spring is gold plated and contacts a large area of gold leaf glued to the individual's fingernail. The validator controller can now read and record the capacitance formed by the gold leaf plate, the individual's fingernail and the conductive flesh underneath the fingernail. This capacitance can be measured by many methods, such as using a switched capacitor circuit with voltage comparators to measure the specific capacitance value. The resulting value is then stored in the Flash PROM in the validator logic circuit 20, typically an 8-bit MPU with Flash or EEPROM non-volatile memory, such as a Motorola MC6811 Series Processor. The key is then removed, and the individual is ready to use the ~~device~~ human machine interface 10. The ~~security apparatus~~ human machine interface 10 powers itself down automatically after 10 minutes of operation without a "reasonable" amount of capacitance being measured, indicating the absence of an individual's finger. Alternatively, the individual powers down the unit by re-engaging the same aforementioned push-button switch.

Please replace paragraph numbers [0095]-[0097] on pages 27 and 28 with the amended paragraphs that follow.

[0095] In yet another specific firearm example, the data transmitter 14 is glued to the individual's fingernail. Capacitance plates 34 are integrated with the data transmitter 14 and are positioned close or in contact with the fingernail to form a measurable specific and individualized capacitance. This specific and individualized capacitance depends on the individual's fingernail characteristics, especially their fingernail thickness, size of their fingernail and the size and location of the capacitance plates 34. As before, a key is inserted into the validator controller 12 and the individual places his or her finger on the firearm trigger and pushes forward to engage a push-button switch and power LEDs in the validator emitter 38,

which illuminates and powers the nail solar cell 40 and the data transmitter 14 circuitry. The fingernail solar cells send power to the nail digital chip 42 and nail analog chip 48. The nail analog chip 48 is dedicated to measuring the fingernail capacitance (formed in a capacitance range of 0-25 picoFarads on the finger) and converting that capacitance measurement value to an 8-bit to 32-bit binary number. This binary number, combined with other data, e.g., checksum and serial number, are approximately 60-bits total in the nail digital chip 42. This communication occurs in serial binary fashion through a shift register clocked at typically 200 KHz to an IR emitter LED, which then illuminates the validator receiver 18 (also infrared). The validator logic circuit 20 gets this CMOS-voltage level digital data from the validator receiver 18, verifies the checksum or CRC code, matches the sent capacitance value, and stores the fingernail digital chip 42 serial number and the fingernail capacitance measurement in the Flash memory PROM in the validator logic circuit 20. The key is then removed and the individual is ready to use it. In operation, ~~this example of security apparatus~~ human machine interface 10 functions as described above. It is envisioned that these firearm applications would be particularly useful in law enforcement applications.

[0096] In this manner, the ~~present invention~~ human machine interface 10 is not easily lost by or stolen from an authorized user. Further, the present invention is a security apparatus ~~10~~ that is easily retrofitted into existing mechanisms and systems. Also, the ~~security apparatus~~ human machine interface 10 is unusable or effectively unusable during or after a struggle situation in which the valid user ~~looses~~ loses possession of his firearm. In addition, the present invention ~~10~~ provides a signaling device that produces a substantially non-duplicative or non-discoverable signal, increasing the security aspect of the ~~device~~ human machine interface 10.

[0097] The embodiments of the invention, which require no permanently mounted device on the fingernail 24, have numerous advantages over prior security and control devices. These include the following: it is inherently capable of being the fastest, least expensive, smallest, most unobtrusive, ergonomic, most rugged, lowest-power biometric device available. It uses little data storage as opposed to retinal or fingerprint biometric devices, which can typically use 100 bytes or more. It can be less objectionable than a fingerprint identification device to individuals who dislike business or government collecting personal data. ~~It is~~

~~combinable with a fingerprint reader, with no resulting effect on the speed.~~ It can incorporate or be combined with a hidden machine-randomized finger-tactile-generation-response mechanism, which allows verification that the forefinger has not been removed from the individual identified. It leaves no lingering individual data such as a fingerprint. It is small and simple enough to build into a smart card. It discriminates between small children and adults as categories. It inherently has ease of redundancy, i.e. other finger's fingernails can be identified and used as a backup. It is located at a human "decision-point" where intentions are expressed through actions at the tip of the finger. It is a struggle-situation sensitive, i.e., it is more difficult to force an unwilling wearer to perform a verification action than most other biometric devices. It can easily combine multiple devices on multiple fingers for tighter security (up to 10 times). It is extremely difficult to unknowingly or clandestinely read as opposed to other biometric devices. It is especially compatible with firearms. It combines well with a password or pin. If the password is observed, it offers another layer of protection. It is difficult to steal. It requires no user memorization. ~~It has an inherent, built-in physiological, adjustable-selectable expiration period.~~

Please delete the paragraph below the heading ABSTRACT OF THE DISCLOSURE and replace it with the new paragraph that follows.

~~The present invention is a~~ A human machine interface (10) for use in situations requiring authorized access. The human machine interface (10) includes a validator controller (12) and a data transmitter (14). The validator controller (12) includes a validator status actuator (16) in communication with a validator receiver (18) via a validator logic circuit (20). The validator status actuator (16) is configured to process and perform actions based upon data signals (22) received by the validator receiver (18). The data transmitter (14), which is in contact with a human nail (24), transmits the data signal (22) to the validator controller (12).